

They have persisted on the mountain summits because of the arid and relatively warm conditions of the shallow soil and exposed dark rocks, and the consequent freedom from competition with the surrounding mesic forest types.

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FIG. 1. Location of islands of xeric flora in central western Oregon.

## BALSAMORHIZA TEREBINTHACEA AND OTHER HYBRID BALSAM-ROOTS

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*Balsamorhiza terebinthacea* (Hook.) Nutt. was one of the earliest described taxa in the genus *Balsamorhiza*. It first appeared in the literature as *Heliopsis* (?) *terebinthacea* Hooker ([1834] 1840) and was described in the same article with the type species, *Balsamorhiza Hookeri*, which Hooker called *Heliopsis* (?) *balsamorhiza*. The taxon has been accepted as a species by most subsequent authors, including Peck (1941), Rydberg (1917), St. John (1937), and by the monographer of the genus, Ward M. Sharp (1935).

Hooker's diagnosis was as follows (the italics by the present author):

H.? *terebinthacea*: pubescens, foliis radicalibus *petiolatis-ovato-lanceolatis sinuato-pinnatifidis crenato-serratis*, involucri foliolis numerosis lanceolato-acuminatis imbricatis caulem paucifoliatum subaequantibus, radice crassa balsamifera. Hab. Common at Fort Vancouver, on the Columbia, and in the grounds of the interior. Douglas.—*Closely allied to the preceding species* [H. *balsamorhiza*], and yielding in its root the same terebinthine juice.

In studies on natural hybridization in the genus *Balsamorhiza*, Ownbey and Weber (1943) showed that intersectional crosses between species of the Section *Eubalsamorhiza*, with pinnatifid leaves, and the Section *Artorhiza*, with triangular-cordate leaves, result in introgressants which tend to preserve the habit and leaf-size of the *Artorhiza* parent while they pick up various degrees of the lobing of the *Eubalsamorhiza* parent. Thus, a large number of intermediate individuals occur which have the general leaf outline of the *Artorhiza* species, but which possess leaf-margins varying from a few scattered crenate teeth all the way to deeply and irregularly pinnatifid. In taxonomic practice, these individuals have been called *Balsamorhiza terebinthacea*.

The type specimen of *B. terebinthacea* (fig. 1) is such an individual. It is apparently a derivative of the cross, *B. deltoidea* Nutt.  $\times$  *B. Hookeri* (Hook.) Nutt., since this is the only combination of parental types which occurs in the vicinity of the type locality. In addition to the type specimen, Sharp (1935), in his monograph of the genus, cited the following specimens under his treatment of *B. terebinthacea* which probably represent hybrids of other parental combinations: *Suksdorf 10866, 360, 135*, Klickitat County, Washington, = *B. Careyana*  $\times$  *B. Hookeri*; *Peck 8456*, Josephine County, Oregon, = *B. deltoidea*  $\times$  *B. platylepis*; *Butler 1337*, Siskiyou County, California = *B. deltoidea*  $\times$  *B. Hookeri* var. *lanata*. Similar individuals occur throughout the Pacific Northwest wherever the ranges and habitats of *Artorhiza* and *Eubalsamorhiza* species overlap.

It can be demonstrated, therefore, that *Balsamorhiza terebinthacea* is not a natural taxon except as it represents similar phenotypes obtained from crosses involving different pairs of species. It has, nevertheless, been a convenient name under which to file intermediate specimens in the herbarium when only one specimen from a given population is available. Unfortunately, collectors often seek out the unusual form in a population and neglect to preserve the typical specimens of the parental types which might indicate the probable parentage.

Although the name *B. terebinthacea* has provided a convenient category for filing the progeny of *B. deltoidea* and *B. Hookeri* crosses, as well as intermediate forms of unknown parentage, the writer feels it best not to encumber nomenclature by giving names to all hybrids of various parental combinations. The better course would be to designate as hybrids those names that have already been published as species, and in the future, whenever possible, refer to other known hybrids by their parental names connected by an  $\times$ . Previously published names in *Balsamorhiza* that can now be designated as hybrids, and their parental equivalents, are cited below.

$\times$  ***Balsamorhiza terebinthacea*** (Hook.) Nutt. *Trans. Am. Philos. Soc.* II. 7:349. 1841, hybrid, *B. deltoidea* Nutt.  $\times$  *B. Hookeri* (Hook.) Nutt.

$\times$  ***Balsamorhiza Bonseri*** St. John, *Fl. S.E. Wash. and Adj. Idaho*, 1937, hybrid, *B. rosea* Nels. & Macbride  $\times$  *B. sagittata* (Pursh) Nutt.

$\times$  ***Balsamorhiza tomentosa*** Rydberg, *Bull. Torrey Club* 27: 628. 1900 (*B. incana* var. *tomentosa* Sharp), hybrid, *B. incana* Nutt.  $\times$  *B. sagittata* (Pursh) Nutt.

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#### REFERENCES CITED

HOOKEER, W. J. [1834] 1940. *Flora Boreali-Americana*. London, H. G. Bohn.



PLATE 1. TYPE SPECIMEN OF BALSAMORHIZA TERBINTHACEA (HOOK.)  
 NUTT.